

**SULIT**



Second Semester Examination  
2017/2018 Academic Session

May/June 2018

**EBS328/3 – Geokimia Carigali**  
***[Geochemical Exploration]***

Duration : 3 hours  
*[Masa : 3 jam]*

Please ensure that this examination paper contains NINE printed pages before you begin the examination.

*[Sila pastikan bahawa kertas peperiksaan ini mengandungi SEMBILAN muka surat yang bercetak sebelum anda memulakan peperiksaan ini.]*

This paper consists of SEVEN questions.

*[Kertas soalan ini mengandungi TUJUH soalan.]*

**Instruction:** Answer **FIVE** (5) questions. If a candidate answers more than five questions only the first five questions answered in the answer script would be examined.

**[Arahan:** Jawab **LIMA** (5) soalan. Jika calon menjawab lebih daripada lima soalan hanya lima soalan pertama mengikut susunan dalam skrip jawapan akan diberi markah.]

The answers to all questions must start on a new page.

*[Mulakan jawapan anda untuk semua soalan pada muka surat yang baru.]*

You may answer a question either in Bahasa Malaysia or in English.

*[Anda dibenarkan menjawab soalan sama ada dalam Bahasa Malaysia atau Bahasa Inggeris.]*

In the event of any discrepancies in the examination questions, the English version shall be used.

*[Sekiranya terdapat sebarang percanggahan pada soalan peperiksaan, versi Bahasa Inggeris hendaklah digunakan.]*

...2/-

**SULIT**

1. (a). Elaborate what are the differences between primary geochemical anomalies and secondary geochemical anomalies?  
*Perjelaskan perbezaan antara anomali-anomali geokimia primer dan anomali sekunder?*  
(50 marks/markah)
- (b). Please elaborate the following  
*Sila perjelas maksud-maksud berikut*
- (i). Geochemistry and Geochemical analysis  
*Geokimia dan analisa geokimia*
- (ii). Pathfinder elements  
*Unsur Jejak*
- (iii). Sediment  
*Sedimen*  
(50 marks/markah)
2. (a). Level and activities of geochemical exploration could be classified into regional and local exploration scales. Please explain.  
*Peringkat atau aktiviti pencarigalian geokimia boleh dikelasifikasikan kepada skala wilayah dan tempatan. Sila jelaskan.*  
(30 marks/markah)
- (b). Briefly elaborate the following  
*Sila jelaskan yang berikut*
- (i). Mineral Prospect  
*Prospek mineral*
- (ii). Pathfinder elements  
*unsur jejak*
- (iii). Geochemical cycle  
*Kitaran Geokimia*  
(30 marks/markah)

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- (c). Table A provides the information on alluvium/placer gold exploration data conducted over an area estimated about 85 hectares.

*Jadual A berikut memaparkan maklumat mengenai data eksplorasi emas lanar/alluvium disuatu kawasan yang berkeluasan 85 hektar.*

Table A = Data of Alluvial gold at Pahang  
*Jadual A : Data carigali emas lanar di Pahang*

1	Total number of bore (not on higher ground), i.e. 50 nos and total depth (Bil. Lubang gerudi kedalam keseluruhan)	250m
2	Total mineable gold reserves area / (Jumlah kawasan emas boleh lombong)	90 hectares / hektar
3	Average depth/ Kedalaman purata	5.6m
4	Ground value/Nilai bijih = $150\text{mg/m}^3$	$150\text{mg/m}^2$
5	Purity/ Ketulenan	800 ppt

Please estimate the proven recoverable of gold reserve and total recoverable gold ore (Reserve@800ppt) purity total?

*Sila anggarkan keboleh perolehan rezab emas dan jumlah emas yang boleh diperolehi (rezab@800ppt) ketulenan pukal?*

(40 marks/markah)

3. Please answer the following

*Jawab soalan berikut*

- (a). State and describe three (3) main methods in geochemical sampling according to their important?

*Nyata dan perihalkan tiga (3) kaedah utama dalam persampelan geokimia menurut turutan kepentingannya?*

(40 marks/markah)

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- (b). Table 1 provides the soil trenching geochemical data from Tersang prospect, Raub Pahang during gold exploration activities. Plot and determine the anomaly distribution pattern and potential target for the next survey?

Trenching orientation: North-South, Interval: 100m, Trenching no with Au assay result : LA- LC. Interval of sampling points for each trech is 20m

*Jadual 1 memberikan data persempelan tanah secara perparitan dari Prospek Tersang, Raub, Pahang semasa aktiviti penjelajahan emas. Plot peta anomali dan corak taburan anomali dan sasaran berpotensi untuk langkah penyesiatan selanjut?*

*Orientasi perparitan utara-selatan, Sela 100 m, No perparitan dengan keputusan analisa : LA- LC. Jarak sela persampelan bagi setiap parit ialah 20 m*

Table 1 : Geochemical assay data for Au from 3 trenching (ppm)

*Rajah 1 : Data esei geokimia emas bagi 3 perparitan (ppm)*

L-A	L-B	L-C
-	6	-
-	7	-
<5	15	-
<5	6	-
<5	15	-
13	33	-
25	26	-
29	17	-
40	70	-
127	245	26
510	600	78
501	470	70
494	142	97
490	400	102
468	410	103
21	320	510
196	300	560
212	510	260
149	149	228
-	204	63
-	70	159
-	114	18
-	191	57
-	210	213
-	58	22
-	7	11
-	-	-
-	-	< 5

(60 marks/markah)

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4. (a). Discuss the approach of mineral exploration using hydro-geochemical analysis and its disadvantage?

*Bincang pendekatan penjelajahan mineral secara hidro-geokimia dan kelemahannya?*

(30 marks/markah)

- (b). The following Table 2 provides some geochemical data from borehole (all elements in ppm, except Fe%, Pt, Pd, Rh ppb)

*Jadual 2 berikut membentangkan sebahagian data geokimia lubang gerudi, (semua unsur dalam ppm, kecuali Ferum%, Pt, Pd, Rh ppb)*

Table 2 : Diamond drill borehole log description

*Jadual 2 :Keterangan Log Lubang gerak intan*

Site no	Field description (Keterangan)	BH No.	Top Depth	Au	Ag	Cu	Pb	Zn	As	Sb	Fe %
4062	Graphitic shale / Syal Grafik	10	6.00	0.112	0.70	29	24	109	400	5	2.0
4063	Graphitic shale / Syal Grafik	10	10.00	0.109	0.80	31	23	168	400	6	1.8
4064	Graphitic shale / Syal Grafik	10	14.00	0.049	0.70	27	18	130	300	7	1.8
4065	Graphitic shale / Syal Grafik	10	18.00	0.081	0.60	30	25	137	400	3	1.9
4066	Graphitic shale / Syal Grafik	10	22.00	0.134	0.80	33	54	197	3546	8	2.9
4046	Graphitic shale / Syal Grafik	10	25.60	0.009	0.60	17	32	84	25	10	1.2
4047	Fault gouge / Bubuk Sesar	10	27.90	0.098	0.60	20	29 0	710	100	9	2.5
4048	Calcite vein in shale / Telerang Kalsit Dalam Syal	10	30.00	1.187	0.50	15	74	166	1000	1	2.6
4049	Fault gouge, shale/ quartz carbonate vein / Bubuk Sesar Syal / Telerang Kuarza Berkarbonat	10	32.00	0.652	0.90	19	64	35	200	1	3.9

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The above borehole log provide the geological information about the rock formation and assay results of gold exploration

*Log lubang gerudi diatas memberikan maklumat mengenai formasi batuan dan keputusan penganalisaan data ekplorasi emas, sila perjelas/takrif perkara-perkara berikut*

- (i). The major bedrock strata penetrated during the drilling program

*Strata batuan dasar yang ditembusi sewaktu program pengerudian*

- (ii). What is quartz vein and quartz-carbonate

*Apa itu telerang kuarza dan telerang kuarza-karbonat*

- (iii). Major, minor and path finder elements

*Unsur-unsur utama, minor dan unsur-unsur jejak*

- (iv). The possible types of sulphide minerals encountered in the drillcore.

*Kemungkinan jenis-jenis mineral sulfida yang berkemungkinan ditemui dalam teras lubang*

- (v). Plot and discuss the distribution pattern of gold (Au) against the depth in association with Pb, Cu and As.

*Plot corak taburan emas (Au) melawan kedalaman berasosiasi dengan Pb, Kupram dan Arsenik.*

Based on this finding discuss the overall finding elucidated by the drilling information

*Berdasarkan dapatan ini bincangkan keseluruhan capaian sebagai digambarkan oleh maklumat carigali berkenaan*

(70 marks/markah)

...8/-

5. (a). State and describe three (3) main methods in geochemical sampling according to their important

*Nyata dan perihalkan tiga (3) kaedah utama dalam persampelan geokimia menurut turutan kepentingannya*

(40 marks/markah)

- (b). Briefly define/discuss the following :

*Secara ringkas takrif/bincang perkara-perkara berikut :*

- (i) Geochemical signature of mineralization

*Petunjuk geokimia suatu pemineralan*

- (ii) Cut-off grade

*Gred terendah/minima*

- (iii) Grab sample and composite sample

*Persampelan rambang dan persampelan komposit*

- (iv) Value of an ore body/deposit

*Nilai suatu jasad bijih/mendapan bijih*

(60 marks/markah)

6. (a). Geochemical exploration could be carry-out via three main methods of survey used in the geochemical exploration program (orientation, reconnaissance and detailed surveys). Please elaborate?

*Program eksplorasi penjelajahan geokimia boleh dijalankan menerusi tiga kaedah survei utama (Terarah, tinjauan dan terperinci), sila jelaskan.*

(40 marks/markah)



(b). Please briefly define the following

*Secara ringkas takrif atau perelaskan perkara-perkara berikut*

(i). Eh-pH condition or relationship in geochemical data exploration

*Kondisi atau pertalian data Eh-pH dalam ekplorasi geokimia*

(ii). Briefly discuss the relationship of metal adsorption of Cu, Pb and Zn with pH

*Secara ringkas bincang perhubungan penyerapan unsur-unsur logam Cu, Pb dan Zn dengan nilai pH*

(iii). List down the common apparatus and equipments used in mineral exploration from early to final stages.

*Sila senaraikan peralatan dan perkakasan yang digunakan dalam penjelajahan mineral daripada peringkat awal hingga akhir.*

(60 marks/markah)

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